

## CLAIMS

What is claimed is:

1. A system for transferring spent nuclear fuel to a cask comprising:  
a below grade opening adapted for receiving a cask;

a cask support means positioned within the opening, the cask support means capable of

10 vertical movement; and

means for vertically moving the cask support means;

wherein the cask support means is capable of lowering the cask within the opening.

2. The system of claim 1 further comprising a shell forming walls of the opening.

3. The system of claim 2 wherein the cross section of the shell is slightly larger than

15 the cross section of the cask.

4. The system of claim 3 wherein the shell and the cask are cylindrical.

5. The system of claim 1 wherein the means for vertically moving the cask support means is at least two lifting jacks.

6. The system of claim 5 wherein the plurality of lifting jacks are coupled so as to keep the cask support means approximately level during vertical movement.

7. The system of claim 5 wherein the number of lifting jacks is three.

8. The system of claim 5 wherein the jacks are located outside the opening and are accessible from grade level.

9. The system of claim 1 wherein the cask support means has a fully lowered position and a fully raised position.

10. The system of claim 9 wherein when the cask support means is in the fully raised position the cask support means is below grade.

11. The system of claim 9 wherein when the cask support means is in the fully lowered position and supporting a cask having a height, at least a major portion of the cask's height is below grade level.

12. The system of claim 11 wherein approximately 30 inches of the cask is above grade level.

13. The system of claim 1 wherein the opening has a bottom, the system further comprising a setdown structure positioned at the bottom of the opening and below the cask support means.

5        14. The system of claim 13 wherein when the cask support means is in a fully lowered position, the cask support means contacts the setdown structure and the cask support means and any load being borne by the cask support means is supported by the setdown structure.

10      15. The system of claim 1 wherein the cask support means is a platform having a center and a top surface.

16. The system of claim 15 wherein the cask support means has a hole near the center and a plurality of cask positioning plates on the top surface.

17. The system of claim 1 further including vertical guide rods on which the cask support means can move.

15      18. The system of claim 17 wherein the vertical guide rods have a top and a bottom, the vertical guide rods being secured at the top so that upon loading the cask support means the vertical guide rods are in tension.

19. A method of transferring a canister of spent nuclear fuel to a cask comprising the steps of:

lowering a receiving cask having a height into a below grade opening so that a portion of the receiving cask's height is below grade level; and

transferring the canister to the receiving cask.

20. The method of claim 19 further comprising the steps of:

placing the receiving cask on a cask support means located within the opening, the cask support means capable of vertical movement;

lowering the receiving cask into the opening by lowering the cask support means;

aligning the canister above the receiving cask; and

lowering the canister into the receiving cask.

21. The method of claim 20 wherein at least two jacks are used to lower the cask support means.

22. The method of claim 21 wherein the at least two lifting jacks are coupled so as to keep the cask support means approximately level during vertical movement.

23. The method of claim 21 wherein the number of lifting jacks is three.

24. The method of claim 21 wherein the jacks are outside the opening and are accessible from grade level.

- 5        25. The method of claim 20 wherein a shell is used to form walls of the opening.
26. The method of claim 25 wherein the shell and the receiving cask are cylindrical.
27. The method of claim 25 wherein the cross section of the shell is slightly larger than the cross section of the lowered receiving cask.
- 10      28. The method of claim 27 further comprising inserting one or more lateral restraints between the shell and receiving cask.
29. The method of claim 20 wherein the cask support means has a fully lowered position and a fully raised position.
- 15      30. The method of claim 29 wherein when the cask support means is in the fully raised position the cask support means is below grade level.
31. The method of claim 29 wherein when the cask support means is in the fully lowered position, at least a major portion of the receiving cask's height is below grade level.
- 20      32. The method of claim 20 wherein about 30 inches of the receiving cask is above grade level.
33. The method of claim 20 wherein the opening has a bottom with a setdown structure positioned at the bottom of the opening and below the cask support means.
- 25      34. The method of claim 33 wherein when the cask support means is in a fully lowered position, the cask support means contacts the setdown structure and the cask support means and any load being borne by the cask support means is supported by the setdown structure.
35. The method of claim 20 wherein the cask support means is a platform having a center and a top surface.
36. The method of claim 35 wherein the cask support means has a hole near the center and a plurality of cask positioning plates positioned on the top surface.
- 30      37. The method of claim 20 wherein the cask support means moves along a plurality of vertical guide rods.
38. The method of claim 37 wherein the vertical guide rods have a top and a bottom, the vertical guide being secured at the top so that any loading from the cask support means results in the vertical guide rods being in tension.